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Dental health-care service utilisation and its determinants in West Iran: a cross-sectional study

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Background: Dental health care is not only an effective strategy for the prevention, early diagnosis and treatment of oral diseases but also contributes to the general health of communities. This study aimed to investigate the situation of dental health-care service utilisation and its determinants in Kermanshah city, western Iran, in 2015. **Methods and materials:** A cross-sectional study on a total of 894 household heads was conducted. The participants were selected using a multistage sampling technique. A self-administered questionnaire was used to collect the data. Multiple logistic regression was performed to assess factors associated with utilisation of dental-care services and a negative binomial regression was carried out to identify the main factor associated with the frequency of visiting a dentist for dental health care. A statistically significant association was considered at a value of $P < 0.05$. All the analyses were performed using STATA version 12. **Finding:** Of the total household heads who participated in the study, 60.3% and 9.9% reported visiting a dentist for dental treatment in the past year and for 6-monthly dental check-ups, respectively. The average ± standard deviation number of visits by a respondent was 2.08 ± 2.97. Of the total number of respondents, 281 (31.4%) reported visiting a dentist once or twice in the last 12 months for dental health-care services, while 28.9% reported visiting a dentist more than twice in the same time period. Ageing, having dental insurance, higher income, being a university graduate, self-rated poor oral health and not regularly brushing own teeth were the main factors associated with utilisation of dental health-care services. **Conclusion:** Our study indicates that dental health-care utilisation among households in the study area was influenced by a number of factors, including being socio-economically disadvantaged, self-rated poor oral health and not regularly brushing own teeth. Therefore, in this setting, dental-intervention programmes, including dental health insurance, should focus on mechanisms that can strengthen utilisation of preventive dental health-care services among disadvantaged households.

Key words: *Dental care, socio-economic determinants, utilisation, Iran*

INTRODUCTION

Oral health is an important component of public health. Poor oral health not only affects the quality of life of individuals but also poses a problem for societies as well as health systems in general. The high prevalence of dental disorders and their treatment costs impose a considerable financial burden on health systems[1–4]. Evidence from developed countries indicates a declining trend of dental diseases, whilst in developing countries there are no clear trends. A few studies in developing countries have reported on dental-care utilisation and oral health status. Yet, evidence on the status of dental health-care utilisation and oral health remains vital for planning and evidence-based policies in the health sector. Knowledge on factors affecting dental health-care utilisation is important to inform the health system and develop policies aimed at improving dental health-care services, service utilisation and oral health status of people[3,5]. However, several factors, including economic status, age, gender, educational level and individual's perspective on dental hygiene, affect dental health-care[3,6–9]. Generally, two categories of variables affect

dental health-care utilisation. The first category is related to the individual and includes sociodemographic factors, previous experience, gender, age, individual's perspective on dental hygiene and income. The second category is related to the health system and includes physical and geographical dental services' accessibility. Utilisation of dental health-care services and routine dental check-ups can lead to a better health status and reduced health-care spending for individual service users as well as for the health system. A study among adolescents in the USA reported that 32% of adolescents had never visited a dental clinic for preventive dental services and another 2% had never had preventive dental care[10].

In Iran, both the private and public sectors provide dental health-care services. Based on data from the Iran Medical Council, of the total number of dentists in the country (n = 20,000), about 80% practice in the private sector and the remaining 20% work for the public sector[11]. Only a few studies have reported on the main factors associated with dental health-care utilisation[7,8,12,13]. A study on the demand of mothers for dental health-care services in Yazd city, central Iran, found that 27%, 28% and 45% did not use dental health-care services in the past year, used such services only once or used such services more than once, respectively. Educational level, source of dental care, the individual's attention to oral health, source of oral health information, socio-economic status and financial constraints for obtaining dental care were among several factors affecting dental-care utilisation. The effectiveness of dental-health programme intervention also affects the utilisation of dental health-care services[12]. Little evidence is available regarding access to dental care and on the factors affecting dental-care utilisation in Iran[8,12,14]. Much is unknown about dental health-care utilisation and associated factors in Kermanshah province. The aim of this study was to analyse the status of dental health-care utilisation and to identify the main determinants of dental health-care utilisation in Kermanshah city, western Iran.

METHODS

A cross-sectional study was conducted from the period between October 10 and December 25, 2015 to analyse data on dental health-care utilisation among household heads in Kermanshah city, western Iran. We calculated the sample size using the formula for single proportion[15]:

$$n = \frac{Z^2(p(1-p))}{d^2}$$

The sample size (n) was calculated with a 95% level of significance (z = 1.96), a dental health-care visit prevalence (p) of 0.5 and precision (d) of 0.03. The final sample size calculated was 1,067. Then we determined the sample size for each of the seven districts in the city using the formula for proportionate allocation to population size. Next, the household heads were selected using a systematic random sampling technique by dividing each district's total number of household heads by its allocated sample size. In the absence of the household head, an elder member of the household who was over 18 years of age, was willing to participate in the study and was able to complete the questionnaire, was included.

The data were collected through a self-administered questionnaire for which the validity and reliability was confirmed in previous studies[8,14]. The questionnaire had two parts. The first part was related to participant's sociodemographic characteristics, including age, gender, level of education, employment status, household size, health insurance coverage, dental health insurance and income level. The second part was related to utilisation of dental health-care services. In this study, whether a household's head had visited a dentist for dental treatment in the past 12 months, and the number (frequency) of visits were the dependent variables, while the sociodemographic characteristics and economic status of the household head were the independent variables. Multiple logistic regression analysis was carried out to assess the factors associated with the utilisation of dental health care. A negative binomial regression was used to identify the main factors associated with the frequency of visiting a dentist because the frequency of visits was over-dispersed. Thus, the confidence intervals from the negative binomial modelling are more likely to be narrower than those from the Poisson regression modelling.

Furthermore, multicollinearity among the independent variables was tested using the variance inflation factor (VIF). A mean VIF value of < 10 was acceptable[16]. The Hosmer–Lemeshow chi-square test was also used to examine the goodness-of-fit of the logistic regression. The goodness-of-fit chi-square test on the Poisson modelling indicated that the model was not a good fit. This led to the use of the negative binomial model. A value of $P > 0.05$ indicates that the model fits reasonably well[17]. We performed the deviance goodness-of-fit test for the negative binomial regression model and a value of $P > 0.05$ indicated good fit of the model[18]. All analyses were performed using the statistical package STATA version 12 (Stata Corporation, College Station, TX, USA) and in this study a value of $P < 0.05$ was considered to be statistically significant.

ETHICS

The study protocol was reviewed and approved by the Ethics Committee of the Deputy of Research, Kermanshah University of Medical Sciences (KUMS.REC. 1394.438). Furthermore, each eligible participant was involved in the study in accordance with the ethical code of conduct recommendation of the World Medical Association Declaration of Helsinki. Thus, verbal consent, approved by Deputy of Research in KUMS, was obtained from each participant after explaining the details about the study, including its purpose, and it was explained that the participant has the right to withdraw from the study or interrupt at any point during the data-collection process. The data were collected and analysed with participants remaining anonymous and the results were used only for the research objective.

RESULTS

A total of 894 household heads participated in the study, yielding a response rate of 84%. Of the total respondents, 93.4% were men and the rest were women (*Table 1*). The mean age ± standard deviation (SD) was 44.6 ± 12.1 years (44.3 ± 12 years for men vs. 49.8 ± 14 years for women). The majority (79.3%) of the participants were educated to primary school level and 62.9% were self-employed. The monthly income in 54.4% of households was > 10 million Iranian Rials (IRs). Those who had health insurance coverage and dental insurance accounted for 95% and 18.2%, respectively, of total respondents.

The findings concerning dental health-care utilisation are presented in *Table 2*. The average number of visits to a dentist by the respondents was 2.08 ± 2.97. A total of 540 (60.3%) participants reported visiting a dentist for dental treatment in the last 12 months. More than one-third (35%; $n = 189$) of visits were for tooth extraction, whereas 125 (23.1%) and 90 (16.7%) were for tooth restoration and for teeth cleaning, respectively. Only 88 (9.9%) respondents visited a dentist at least once as part of the 6-monthly dental check-up schedule. Of the total respondents, 792 (88.6%) reported that the cost of dental services was high and the average cost for the household members was 7,710,600 ± 1,906,491 IRs. Again, 281 (31.4%) respondents reported utilisation of dental services once or twice in the last 12 months and 28.9% reported visiting a dentist more than twice in the same time period.

The mean VIF after replacing the first difference was 1.44, and hence acceptable for the analysis. The results from the goodness-of-fit chi-square test indicate that the Poisson modelling was inappropriate and that the negative binomial model was appropriate (deviance goodness-of-fit = 4190.689 and $P < 0.0001$). The independent variables in the estimated model showed that the dependent variable was well fitted (log likelihood = −2104.82 and pseudo R^2 was 0.072). The results from the negative binomial regression (Model 1) indicated that the incident rate ratio (IRR) of visiting a dentist in persons older than 65 years of age was 1.53 times more frequent [IRR = 1.53, 95% confidence interval (95% CI): 1.01–2.31] compared with those younger than 35 years of age (*Table 3*). Those who had dental insurance had an IRR of 1.76 times more frequent visits to a dentist (IRR = 1.76, 95% CI: 1.39–2.23) compared with those without dental insurance. Those who rated themselves as having 'poor oral health' had an IRR of 1.9 times more frequent visits to a dentist (IRR = 1.9, 95% CI: 1.57–2.30) than those who rated themselves having 'good oral health'. Those with a household income of more than 40 million IRs had an IRR of 1.81 times more frequent visits for dental care (IRR = 1.81, 95% CI: 1.09–3.03) than those with a household income of less than 10 million IRs. Moreover, those who did not regularly brush their teeth had an IRR of 1.15 times more frequent visits for dental care (IRR = 1.15, 95% CI: 1.07–1.62) than did those who regularly brushed their teeth.

Table 1 Sociodemographic and economic profile of respondents in relation to dental-care utilisation in Kermanshah city, 2015 ($n = 894$)

Sociodemographic characteristics	*n*	%
Age (years)		
<35 years	186	20.8
35–50 years	424	47.4
51–65 years	231	25.8
>65 years	53	6
Gender		
Male	835	93.4
Female	59	6.6
Household size		
<3	150	16.8
3–5	622	69.5
>5	122	13.7
Income per month (IR)		
<10 million	408	45.6
10–20 million	349	39
20–40 million	111	12.4
>40 million	26	2.9
Education level		
Illiterate	100	11.2
Primary and secondary school	709	79.3
University graduate	85	9.5
Employment status		
Employed	123	13.8
Self-employed	563	62.9
Retired	15	1.7
Unemployed	193	21.6
Health insurance coverage		
Yes	849	95
No	45	5
Dental insurance		
Yes	163	18.2
No	731	81.8

IR, Iranian Rials.

Table 2 Characteristics of study participants in relation to various aspects of dental-care utilisation

Aspects of dental-care utilisation	*n*	%
Self-rated oral health		
Good	344	38.5
Poor	550	61.5
Oral health as important as health elsewhere in the body		
Yes	837	93.6
No	57	6.4
Frequency of visits to a dentist in the last year		
Zero	355	39.7
1–2 times	281	31.4
More than 2 times	258	28.9
Place for dental treatment		
Public	511	57.2
Private	383	42.8
Cost of dental services for household		
High	792	88.6
Middle	102	11.4
Low	0	0
Visited the dentist in the past 12 months		
Yes	540	60.3
No	354	39.7
Visited dentist for check-up every 6 months		
Yes	89	9.9
No	805	90.1
Source of dental treatment		
Self-medication	318	35.6
Dentist	524	58.6
Herbal treatment	52	5.8
Regular brushing		
Yes	598	66.9
No	296	33.1
Have a dental pain but do not visit dentist		
Yes	652	72.9
No	242	28.1

The multivariate logistic regression (Model 2) also indicated that those older than 65 years of age were 1.34 times [odds ratio (OR) = 1.34, 95% CI: 1.09–1.75] more likely to visit a dentist for dental care compared with those younger than 35 years of age (*Table 3*). Again, participants with dental insurance were 1.66 times (OR = 1.66, 95% CI: 1.13–2.45) more likely to visit a dentist than were those without dental insurance. The participants who rated themselves as having 'poor oral health' were 1.91 times (OR = 1.91, 95% CI: 1.42–2.57) more likely to visit a dentist for oral care than were those with good oral health. Those who graduated from a university were 2.37 times more likely (OR = 2.37, 95% CI: 1.006–5.6) to visit a dentist for oral care than those who were illiterate. Those who regularly brushed their teeth were 1.79 times more likely (OR = 1.79, 95% CI: 1.31–2.45) to visit a dentist for oral care compared with those who did not.

DISCUSSION

This study analysed the status of dental-care utilisation and determinants of dental-care service use among household heads in Kermanshah city, western Iran, in 2015. The findings enabled us to understand the characteristics that contributed to the lower utilisation of dental-care services of household heads in the study area. The findings can also contribute to knowledge about factors affecting dental health-care services in the area as well as in Iran as a whole. Identifying the main factors affecting dental health-care services is essential for planning and evidence-based decisions to improve the utilisation of such services.

Our empirical analysis indicted a statistically significant relationship between age and the probability of utilising dental health-care services. Older age is an important factor for seeking and using health-care services in general and dental health-care services in particular. The findings revealed that those participants in the age category of ≥65 years had the highest probability of visiting a dentist and utilising dental-care services compared with those < 35 years of age. Similarly, a study in Australia reported a higher probability of visiting a dentist and receiving dental care among men and women in the older age category than those in the younger age category[19]. Furthermore, a study in Thailand also found that age of the participant was one of the main factors affecting the demand for utilisation of dental-care services. Visiting a dentist and utilisation of dental services tended to increase with age[20]. Health is a capital good; accordingly, as ageing increases health will depreciate at a certain rate. Thus, to maintain health, utilisation of health services increases with ageing. Generally, according to the Grossman Model on age, not only the demand for dental services but also the demand for all health care is U-shaped. At birth, the demand for health services is high and declines as age increases to middle age. Then, the demand for health services increases[21]. Our study is limited to household heads. Hence, only individuals of middle age and above were included in the study. Rezaei *et al.*[14] indicated that older age is positively associated with the utilisation of dental care. It was found that the proportion of individuals ≥50 years of age who visited a dentist was 12% higher than those <30 years of age.

Having or not having dental insurance can influence the probability of dental-care service use. In our study, the households with dental insurance had a higher probability of using dental-care services. The probability of dental-care utilisation among people with dental insurance in the negative binomial regression (76%) and in the multiple logistic regression (66%) was higher than in those without dental insurance. One of the main reasons for the higher probability of seeking dental care among people with dental insurance could be related to the increased access to dental care as a result of decreasing the cost of dental care at the point-of-care because of the insurance. A recent study that investigated the effect of dental-care

Table 3 Results of negative binomial [incident rate ratio (IRR)] and multiple logistic regressions in relation to dental-care utilisation in Kermanshah city, 2015 (n = 894)

Dependent variables	Model 1*		Model 2†	
	IRR (95% CI)	*P*-value	OR (95% CI)	*P*-value
Age group (years)				
<35 years	Ref	–	Ref	–
35–50	1.03 (0.81–1.31)	0.794	1.14 (0.78–1.66)	0.484
51–65	1.01 (0.76–1.34)	0.919	0.92 (0.59–1.43)	0.731
>65	1.53 (1.01–2.31)	0.043	1.34 (1.09–1.75)	0.049
Dental insurance				
No	Ref	–	Ref	–
Yes	1.76 (1.39–2.23)	0.000	1.66 (1.13–2.45)	0.010
Self-rated oral health				
Good	Ref	–	Ref	–
Poor	1.9 (1.57–2.30)	0.000	1.91 (1.42–2.57)	0.000
Income per month (Iranian Rials)				
<10 million	Ref	–	Ref	–
10–20 million	1.03 (0.76–1.38)	0.846	1.35 (0.84–2.14)	0.205
20–40 million	1.09 (0.88–1.34)	0.416	1.02 (0.73–1.42)	0.897
>40 million	1.81 (1.09–3.03)	0.022	1.00 (0.41–2.42)	1.00
Educational level				
Illiterate	Ref	–	Ref	–
Primary and secondary school	0.847 (0.66–1.08)	0.189	1.04 (0.68–1.59)	0.842
University graduate	1.01 (0.61–1.67)	0.966	2.37 (1.006–5.6)	0.048
Employment status				
Unemployed	Ref	–	Ref	–
Retired from employment	0.91 (0.44–1.87)	0.806	0.86 (0.27–2.69)	0.804
Self-employed	1.06 (0.85–1.34)	0.996	1.35 (0.93–1.94)	0.105
Employed (private and governmental)	1.00 (0.72–1.38)	0.582	1.04 (0.62–1.73)	0.877
Regular brushing				
Yes	Ref	–	Ref	–
No	1.15 (1.07–1.62)	0.008	1.79 (1.31–2.45)	0.000

*Negative binomial regression.
†Multiple logistic regression.
95% CI, 95% confidence interval; OR, odds ratio.

insurance on dental health-care use found a significant, positive impact of dental-care coverage and dental-care use. The dental insurance increased the probability of visiting a dentist by 13%[22]. Our findings are comparable with reports from studies in Australia[23], Canada[24] and the USA[25].

In our study, there was a statistically significant, positive association between the household head's income and visiting a dentist. This is consistent with a study that reported a positive link between a high income and increased frequency of visiting a dentist[3]. There is also a positive association between utilisation of dental health-care services and income. Hence, dental care is considered a necessity and the utilisation of dental-care services increases with income[26]. Other studies in Iran reported a positive and less than one income elasticity of health services[27–29]. This indicates that health care is considered a necessity in Iran. A study in Australia found that a 10% increase in income results in an 8% increase in dental-care use[30]. Our findings also revealed a statistically significant relationship between level of education and the frequency of visiting a dentist. That is, a higher level of education was associated with utilisation of dental care among the household heads. On the other hand, individuals with a higher educational level tended to have a healthy lifestyle by seeking treatment for their dental conditions at an earlier stage. Manski and Magder [31] in 1998 and Van der Heyden *et al.*[32] in 2003 independently found that a higher level of education was associated with a greater use of dental care. Nishide *et al.*[33] reported that low income was associated with a decreased rate of dental health-care utilisation, regardless of the age and gender of the individuals.

Our findings indicated that regular toothbrushing and good oral health are significantly associated with lower dental health-care utilisation. This association was also reported in other studies[34,35]. Another study conducted among adults found that dental health-care utilisation was influenced by toothbrushing and dentition status[36].

This is the first attempt to examine the main socio-economic determinants, and frequency, of utilisation of dental health-care services in Kermanshah province, western Iran. The findings provided useful information that can contribute to improving the utilisation of dental health care among socio-economically disadvantaged households. Besides, it contributes to increased public awareness regarding preventive oral-health care and for improving the comprehensive insurance

coverage for dental care. Despite the importance of the information about dental health-care service utilisation and its determinants in western Iran, the study has some limitations. First, the data used for the analysis were self-reported data and may be less accurate compared with other sources of data, such as observational data or data collected from dental centres. Second, the generalisability of the present study is limited to the study areas. Third, other factors, such as fear of pain during dental services, quality of dental care, distance from health facility or a dentist's clinic and the status of teeth and number of decayed teeth, might have an effect on the use or non-use of dental services and were not taken into consideration in this study. Therefore, further research is needed to investigate the influence of these factors on the utilisation of dental health care in Iran.

CONCLUSION

Utilisation of dental-care services, including both visiting a dentist and the frequency of visiting a dentist, were found to be strongly associated with household income, age, being a university graduate, self-rated poor oral health and having dental insurance among the study participants. To address these issues, dental intervention programmes in the setting should focus on approaches that can increase utilisation of dental health-care services among adults.

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Conflict of interest

The authors declare that there is no conflict of interest.

Authors' contributions

All the authors equally contributed to the development of the manuscript and read and approved the final work.

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